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CONFERENCE:

1996 AIAA Aerospace Science Meeting
Reno, NV
January 1996

SESSION:

Space Environment Effects on Space Systems: Scientific Aspects
Bob Skrivanek/Shu Lai, organizers

ABSTRACT:

**Spacecraft Charging, An Update
(Invited Review Paper)**

Nearly twenty years after the landmark SCATHA program, spacecraft charging and its associated plasma interactions continue to be major issues for Earth-orbiting spacecraft. Although typically thought of as a surface effect on geosynchronous spacecraft, low-altitude and internal charging phenomena are increasingly causing concern. This review will, following a brief summary of the state of the art in surface charging, concentrate on the issues tied to the dense, low altitude plasma environment and the auroral zone and on the problems introduced by internal charging and related processes (buried charge and deep dielectric charging). The latter in particular is believed to be the principle cause of several recent anomalies on geosynchronous spacecraft and as such has become a major area of concern for spacecraft designers. Likewise, with the advent of tethered spacecraft and the deployment of the international Space Station (shortly), low altitude charging has taken on a new significance and urgency. Each of these areas is described with emphasis on both the environments causing the phenomena and on the potential effects.